WHAT IS CLAIMED IS:

1. A superconducting cable, comprising:

(a) a core member; and

(b) a first high temperature superconducting wire wrapped helically around the core member, where the first high temperature superconducting wire comprises

(i) a first high temperature superconducting component having a first end and a second end;

(ii) a layer of a first solder material, a portion of the solder layer attached to at least a portion of the first end of first high temperature superconducting component; and

(iii) a second high temperature superconducting component having a first end and a second end, at least a portion of the first end of the second high temperature superconducting component attached to a portion of the solder layer,

wherein the portion of the first high temperature superconducting component attached to the solder material and the portion of the second high temperature superconducting component attached to the solder material form an overlap segment;

wherein the shape of the first end of at least one of the first and second high temperature superconducting components is adapted to minimize strain concentration of said wires.

2. The cable of claim 1, further comprising at least one protective layer connected to the first ends of the first and second high temperature superconducting components.

3. The cable of claim 1, wherein a section of the first superconducting wire having a length at least 100 times the length of the overlap segment has a critical current at least 80% of the lesser of critical currents of the first and second high

temperature superconducting components, where critical current is determined using a 1 μV/cm criterion.

4. The cable of claim 1, further comprising a second high temperature superconducting wire wrapped helically around the core, where the first and second high temperature superconducting wires have opposite helicity.

5. The cable of claim 1, wherein the first high temperature superconducting wire is wrapped around the core with a constant pitch, and the shape of the first ends of the first and second high temperature superconducting components are adapted to minimize strain concentrations in first high temperature superconducting wire.

6. The cable of claim 1, wherein the first end of the first high temperature superconducting component is substantially triangular.

7. The cable of claim 6, wherein the first end of the second high temperature superconducting component is substantially triangular.

8. The cable of claim 1, wherein the first end of the first high temperature superconducting component is substantially diagonal.

9. The cable of claim 8, wherein the first end of the second high temperature superconducting component is substantially diagonal.

10. The cable of claim 1, wherein the first end of the first high temperature superconducting component is substantially inverted triangular.

11. The cable of claim 10, wherein the first end of the second high temperature superconducting component is substantially inverted triangular.

12. The cable of claim 3, wherein the overlap segment has a critical current at least 85% of the lesser of the critical currents of the first and second high temperature superconducting components.

13. The cable of claim 3, wherein the overlap segment has a critical current at least 90% of the lesser of the critical currents of the first and second high temperature superconducting components.

14. The cable of claim 3, wherein the overlap segment has a critical current at least 95% of the lesser of the critical currents of the first and second high temperature superconducting components.

15. The cable of claim 3, wherein the overlap segment has a critical current at least 99% of the lesser of the critical currents of the first and second high temperature superconducting components.

16. A method for joining at least two high temperature superconducting components within a superconducting cable, comprising:

providing a first high temperature superconducting component having first and second ends;

providing a second high temperature superconducting component having first and second ends;

applying a solder layer to the first and second high temperature superconducting components to form a joint; and

incorporating the joined first and second superconducting components into a superconducting cable,

wherein the portion of the first high temperature superconducting component attached to the solder material and the portion of the second high temperature superconducting component attached to the solder material form an overlap segment having a critical current at least 80% of the lesser of critical currents of the first and second high temperature superconducting components, the overlap segment critical

current being measured over an article length at least 100 times the length of the overlap segment, where critical current is determined using a 1 μV/cm criterion.

17. The method of claim 16, wherein the overlap segment has a critical current at least 85% of the lesser of the critical currents of the first and second high temperature superconducting components.

18. The method of claim 16, wherein the overlap segment has a critical current at least 90% of the lesser of the critical currents of the first and second high temperature superconducting components.

19. The method of claim 16, wherein the overlap segment has a critical current at least 95% of the lesser of the critical currents of the first and second high temperature superconducting components.

20. The method of claim 16, wherein the overlap segment has a critical current at least 99% of the lesser of the critical currents of the first and second high temperature superconducting components.

21. The method of claim 16, wherein the first end of the first high temperature superconducting component is substantially triangular.

22. The method of claim 21, wherein the first end of the second high temperature superconducting component is substantially triangular.

23. The method of claim 16, wherein the first end of the first high temperature superconducting component is substantially diagonal.

24. The method of claim 23, wherein the first end of the second high temperature superconducting component is substantially diagonal.

25. The method of claim 16, wherein the first end of the first high temperature superconducting component is substantially inverted triangular.

26. The method of claim 25, wherein the first end of the second high temperature superconducting component is substantially inverted triangular.

27. The method of claim 16, wherein the protective layer is attached by means of a second solder layer.

28. The method of claim 27, wherein the second solder layer has a lower melting temperature than the first solder layer.

29. The method of claim 16, further comprising applying at least one protective layer to the first and second high temperature superconducting components.